nucleic acid and have energy donor molecules on the ends not attached to the particles. The oligonucleotides on the second type of particles have a sequence complementary to a second portion of the sequence of the nucleic acid and have energy acceptor molecules on the ends not attached to the particles. The contacting takes place under conditions effective to allow hybridization of the oligonucleotides on the particles with the nucleic acid, and a detectable change brought about by this hybridization is observed. The energy donor and acceptor molecules may be fluorescent molecules.

In a further embodiment, the method comprises providing a type of microspheres having oligonucleotides attached thereto. The oligonucleotides have a sequence complementary to a first portion of the sequence of the nucleic acid and are labeled with a fluorescent molecule. A type of nanoparticles having oligonucleotides attached thereto and which produce a detectable change is also provided. These oligonucleotides have a sequence complementary to a second portion of the sequence of the nucleic acid. The nucleic acid is contacted with the microspheres and the nanoparticles under conditions effective to allow hybridization of the oligonucleotides on the latex microspheres and on the nanoparticles with the nucleic acid. Then, changes in fluorescence, another detectable change, or both are observed.

In another embodiment, the method comprises providing a first type of metallic or semiconductor nanoparticles having oligonucleotides attached thereto. The oligonucleotides have a sequence complementary to a first portion of the sequence of the nucleic acid and are labeled with a fluorescent molecule. A second type of metallic or semiconductor nanoparticles having oligonucleotides attached thereto is also provided. These oligonucleotides have a sequence complementary to a second portion of the sequence of the nucleic acid and are also labeled with a fluorescent molecule. The nucleic acid is contacted with the two types of nanoparticles under conditions effective to allow hybridization of the oligonucleotides on the two types of nanoparticles with the nucleic acid. Then, changes in fluorescence are observed.

In a further embodiment, the method comprises providing a type of particle having oligonucleotides attached thereto. The oligonucleotides have a first portion and a second portion, both portions being complementary to portions of the sequence of the nucleic acid. A type of probe oligonucleotides comprising a first portion and a second portion is also provided. The first portion has a sequence complementary to the first portion of the oligonucleotides attached to the particles, and both portions are complementary to portions of the sequence of the nucleic acid. The probe oligonucleotides are also labeled with a reporter molecule at one end. Then, the particles and the probe oligonucleotides are contacted under conditions effective to allow for hybridization of the oligonucleotides on the particles with the probe oligonucleotides to produce a satellite probe. Then, the satellite probe is contacted with the nucleic acid under conditions effective to provide for hybridization of the nucleic acid with the probe oligonucleotides. The particles are removed and the reporter molecule detected.

In yet another embodiment of the method of the invention, a nucleic acid is detected by contacting the nucleic acid with a substrate having oligonucleotides attached thereto. The oligonucleotides have a sequence complementary to a first portion of the sequence of the nucleic acid. The oligonucleotides are located between a pair of electrodes located on the substrate. The contacting takes place under conditions effective to allow hybridization of the oligonucleotides on the substrate with the nucleic acid. Then, the nucleic acid bound to the substrate, is contacted with a type of nanoparticles. The nanoparticles are made of a material which can conduct electricity. The nanoparticles will have one or more types of oligonucleotides attached to them, at least one of the types of oligonucleotides having a sequence complementary to a second portion of the sequence of the nucleic acid. The contacting takes place under conditions effective to allow hybridization of the oligonucleotides on the nanoparticles with the nucleic acid. If the nucleic acid is present, a change in conductivity can be detected. In a preferred embodiment, the substrate will have a plurality of pairs of electrodes located on it in an array to allow for the detection of multiple portions of a single nucleic acid, the detection of multiple different nucleic acids, or both.

Each of the pairs of electrodes in the array will have a type of oligonucleotides attached to the substrate between the two electrodes.

The invention further provides a method of detecting a nucleic acid whereint he method is performed on a substrate. The method comprises detecting the presence, quantity or both, of the nucleic acid with an optical scanner.

The invention further provides kits for detecting nucleic acids. In one embodiment, the kit comprises at least one container, the container holding at least two types of nanoparticles having oligonucleotides attached thereto. The oligonucleotides on the first type of nanoparticles have a sequence complementary to the sequence of a first portion of a nucleic acid. The oligonucleotides on the second type of nanoparticles have a sequence complementary to the sequence of a second portion of the nucleic acid.

Alternatively, the kit may comprise at least two containers. The first container holds nanoparticles having oligonucleotides attached thereto which have a sequence complementary to the sequence of a first portion of a nucleic acid. The second container holds nanoparticles having oligonucleotides attached thereto which have a sequence complementary to the sequence of a second portion of the nucleic acid.

In a further embodiment, the kit comprises at least one container. The container holds metallic or semiconductor nanoparticles having oligonucleotides attached thereto. The oligonucleotides have a sequence complementary to portion of a nucleic acid and have fluorescent molecules attached to the ends of the oligonucleotides not attached to the nanoparticles.

In yet another embodiment, the kit comprises a substrate, the substrate having attached thereto nanoparticles, the nanoparticles having oligonucleotides attached thereto which have a sequence complementary to the sequence of a first portion of a nucleic acid. The kit also includes a first container holding nanoparticles having oligonucleotides attached thereto which have a sequence complementary to the sequence of a second portion of the nucleic acid. The kit further includes a second container holding a binding oligonucleotide having a selected sequence having at least two portions, the first portion being